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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Satoru MIYAMOTO et al.
Serial No. : 10/032,172 Group Art Unit 1753
Filed : December 21, 2001 Examiner C. RoDee
Title : **TONER FOR USE IN ELECTROPHOTOGRAPHY, IMAGE FORMATION METHOD USING THE TONER, METHOD OF PRODUCING THE TONER, AND APPARATUS FOR PRODUCING THE TONER**

REPLY UNDER 37 C.F.R. § 1.111

1185 Avenue of the Americas
New York, N.Y. 10036
January 20, 2003

Hon. Commissioner of Patents and Trademarks
Washington, D.C. 20231

S I R:

In response to the final Office Action dated August 29, 2002, applicants respectfully request reconsideration and allowance of the above-identified application for the reasons stated below. This reply is accompanied by a Request (and fee) for Continued Examination under 37 C.F.R. §1.114.

Submitted herewith is a Second Declaration under 37 C.F.R. §1.132 by the joint applicant Miyamoto, who also made the previous Declaration under §1.132 (executed June 21, 2002) which is discussed in the aforementioned final Office Action.

Claims 1 - 8 (toner) and 26 - 33 (toner container) are in the application. Of these, claim 1 and 26 are independent; claims 2 - 8 are dependent on claim 1; and claims 27 - 33 are dependent on claim 26. No claim has been allowed.

Each of claims 1 and 26 is rejected under 35 U.S.C. §102(e) as anticipated by, or under 35 U.S.C. §103(a) as unpatentable over, Karaki et al., and also under §103(a) as unpatentable over Karaki et al. in view of Inaba et al. and Diamond. Additionally,

claim 1 is rejected under §103(a) as unpatentable over Ota et al. in view of Inaba et al. and Diamond.

Applicants' position as to the patentability of these claims over the applied references is as stated in applicants' Amendment filed July 3, 2002, with which the previous Declaration under §1.132 executed June 21, 2002, was submitted. The second Declaration under §1.132, submitted herewith, is intended to supply the evidence that the Examiner, in the final Office Action, found lacking in the previous Declaration. The following discussion addresses the points raised by the Examiner in the final Action.

At p. 2 of the Action, the Examiner asserts that applicants' statement that the "average circularity has nothing to do with the amount of residue" appears inconsistent with the specification (pp. 16-17). The second Declaration (submitted herewith) sets forth the actual circularities of the "toners in Examples 1 to 3 of Karaki" and the "toners in Example 4 and 5 of Ota" used in the comparative tests reported in the previous Declaration. From this data it will be seen that the circularities of the tested toners corresponded to those in the cited Examples of the references, but the amounts of residue (reported in the previous Declaration) are far above the upper limit of residue recited in each of claims 1 and 26. Therefore, contrary to the Examiner's assertion e.g. at p. 3 of the Action, the claimed residue limit is not inherently present in the references' examples.

Applicants explain that the reason why the residue is different between the toner of the present invention and the reference toners is considered to be that the toners have different aggregation property. The aggregation property of a toner is largely influenced by the species and addition quantity of the fluidity imparting agent (i.e., an external additive) and the mixing state of the fluidity imparting agent with the mother toner particles. Therefore, even when toners have the same particle diameter and circularity, the amount of the residue of

the toners changes depending on the species of the materials used and mixing conditions.

At pp. 3-4 of the Action, the Examiner states that the previous Declaration failed to establish how the toners therein tested (and identified with Karaki et al. Examples 1 - 3 and Ota et al. Examples 4 and 5) were made or acquired, or to show that the toners tested had the composition and properties disclosed by the references. This information is now set forth in the attached Second Declaration for each of the toners subjected to the comparative tests reported in the previous Declaration. Although no data were taken for particle size frequency of the tested toners, it is believed that the data now supplied are sufficient to establish that the toners tested were actually toners corresponding to the cited examples of Karaki et al. and Ota et al.

Concerning the measurement of circularity (discussed by the Examiner at p. 4 of the Action), the device identified in the present specification (at p. 18) as used to determine circularity is the same as that identified in JP 10-097095 for the same purpose. Therefore, it is believed that the explanation, in JP 10-097095, of the way circularity is measured using that device is sufficient (in conjunction with the express disclosure of the specified measuring device in applicants' specification) to establish how circularity is measured in applicants' disclosure.

Again, with respect to Ota et al., the second Declaration submitted herewith supplies the evidence which the Examiner found lacking (final Office Action, p. 5) in the first declaration, and thereby (i.e., in conjunction with the test results reported in the previous Declaration) establishes that the residue limit of applicants' claim 1 is not inherent in Examples 4 and 5 of Ota et al.

The Examiner further asserts, in the final Office Action (p. 5), that the previous Declaration "does not show an unexpected result for the inventive toner versus that of Ota et al." But, as stated, the two Declarations taken together show that the residue values of the toners of Ota et al. Examples 4 and 5 are far above

the upper limit recited in claim 1; and Table 1 at pp. 82-83 of applicants' specification shows that significant beneficial results are achieved by the novel residue limit recited in claim 1, which limit (as stated) is not inherently achieved by the cited Ota et al. Examples.

Referring more particularly to Table 1 at pp. 82-83 of their specification, applicants note that each of the Examples (1-12) of the invention, having residual toner below the 10 mg/100 g upper limit of claims 1 and 26, had a rating of 3 for "non-image transferred spots in solid image" whereas all the Comparative Examples (1-7) had ratings of 1 or 2. A rating of 3 corresponds to less than 3 spots whereas ratings of 2 or 1 correspond to 3 or more spots (specification, p. 79); hence the difference between rating 3 (Examples of the claimed invention) and ratings 2 and 1 (Comparative Examples outside the claimed invention) is ***at least 50%*** in terms of number of spots. This is surely a significant difference.

Again, in terms of resolution (specification, pp. 79-80), every Example of the invention had a rating of 3 or more while every Comparative Example had a rating of 2 or less. The rating 3 corresponds to a resolution of 4.5 lines/mm while the rating 2 corresponds to a resolution of 3.6 lines/mm, a difference of 20%.

Moreover, bearing in mind the importance of a ***combination*** of advantageous properties, it is significant that each Example (1-12) of the invention in Table 1 is equal to or better than every Comparative Example (1-7) in ***every*** factor measured, and every one of the invention Examples is better than any given one of the Comparative Examples by at least ***two*** ratings for at least one factor. It is clear from the description in the specification at pp. 76-81 that a difference of two ratings (e.g., 5 vs. 3, or 4 vs. 2, etc.), for each of the factors measured, is significant.

For instance, invention Examples 1-6, 8 and 10-12 are all better than any of Comparative Examples 1-5 and 7 by two or more ratings in the "worm-eaten like spots" factor; invention Examples

2 and 5-12 are all better than any of Comparative Examples 2-4, 6 and 7 by two or more ratings in the "scattering" factor; invention Examples 1-7 and 9-12 are all better than any of Comparative Examples 1-5 and 7 by at least two ratings in the "toner deposition" factor. All of invention Examples 1-12 are better than any of Comparative Examples 1-5 and 7 by at least two ratings in the "non-image transferred spots in solid image" factor, are better than any of Comparative Examples 2, 3 and 7 by at least two ratings in the "resolution" factor, and are better than any of Comparative Examples 2-4, 6 and 7 by at least two ratings in the "image transfer performance" factor.

Further it will be noted from Table 1 that some of the Comparative Examples had circularities within the range of applicants' claim 1, but much higher amounts of residual toner than the upper limit of applicants' claim 1, demonstrating (a) that there is no such relationship between circularity and residue amount as to support the Examiner's asserted inference of inherent anticipation based on circularity values in prior art examples, and (b) that the critical value for the attainment of applicants' superior results is the amount of residue.

Still further, referring to the values of residual toner set forth at p. 2 of the previous Declaration for examples 1-3 of Karaki et al. and examples 4 and 5 of Ota et al., applicants note that all those residue values are equal to or greater than values of residual toner in applicants' Comparative Examples 1-7, all of which failed to provide the beneficial combination of properties achieved by the present invention.

In the rejections of claims 1 and 26 under §103(a) as unpatentable over Karaki et al. or Ota et al. in view of Inaba et al. and Diamond, the Examiner relies on Diamond's statement regarding the desirability of "as narrow a particle size distribution as possible to reduce dirt in the machine environment" as making obvious applicants' claimed upper limit of residual amount (≤10 mg/100 g of toner sieved with a 500 mesh sieve). Applicants respectfully submit, however, that even if

Diamond broadly suggests the avoidance of excessive amounts of large particles, this would not make obvious the criticality of the extremely small proportion of residue required by the claimed invention, whereby beneficial results are obtained as shown by Table 1 of the specification and discussed above. These results are unexpected from the applied references, even considered together, because none of them relates such residue limit to the attainment of the specific improved combination of properties applicants achieve.

Inaba et al., cited for the use of fluidity additives, is not seen to add anything to Karaki et al., Ota et al. and Diamond with respect to the recited value of residue limit.

In summary, applicants submit as follows:

The previous Declaration under §1.132, and the second Declaration accompanying this Reply, together establish that the toners of examples 1, 2 and 3 of Karaki et al. do not inherently meet the residue limitation ("10 mg or less where 100g of said toner is sieved...") set forth in each of applicants' claims 1 and 26, but contain residues in amounts substantially above that limit. Consequently, the rejection of claims 1 and 26 under §102(e) as anticipated by Karaki et al. is overcome by this showing.

There is no suggestion, in Karaki et al., of modifying its disclosure in any way that would meet the aforesaid residue limitation of applicants' claims 1 and 26. It follows that to provide a toner meeting that limitation would not be obvious from Karaki et al., and that the residue limitation distinguishes claims 1 and 26 patentably over Karaki et al.

The previous and second Declarations under §1.132, taken t-ogether, establish that the toners of Examples 4 and 5 of Ota et al. do not inherently meet the residue limitation of applicants' claims 1 and 26, but have amounts of residue substantially above that limit. Moreover, Ota et al. contains nothing that would suggest modifying its disclosure so as to reduce the residue amount to meet applicants' claimed limit. Therefore, Ota et al.,

like Karaki et al., does not teach or make obvious the residue limitation of applicants' claims 1 and 26.

Inaba et al. is relied on only for its showing of fluidity agents and not for the residue limitation. Diamond, cited for teaching "the narrowest practical size distribution," does not teach the need for or advantage of the extremely low upper limit of residue recited in claims 1 and 26. Hence, Ota et al. (or Karaki et al.), Inaba et al. and Diamond, taken together, would not make obvious that distinguishing feature of applicants' invention as defined in claims 1 and 26.

But even if Ota et al.(or Karaki et al.), Inaba et al. and Diamond could properly be considered to make applicants' claimed invention *prima facie* obvious, nevertheless the invention achieves unexpected beneficial results that overcome any such *prima facie* obviousness. The data in Table 1 (pp. 82-83) of applicants' specification show that all the Examples of applicants' invention (satisfying the residue limitation of claims 1 and 26) are significantly better than any of the Comparative examples (all having residue well above the claimed limit) with respect to at least two of six important factors, each invention Example being markedly better (by at least two rating grades) than each Comparative Example with respect to at least one of the factors, and all of the invention Examples exhibiting overall superiority over any Comparative Example with respect to the combination of six factors. These results are surprising and unexpected, because the applied references (considered separately and together) fail to teach or make obvious that such improvements would be realized by reducing the residue amount to meet applicants' claimed residue limitation. The data of Table 1 clearly show that the residue limitation is critical for attaining applicants' beneficial results. The Declarations under §1.132 show that toners meeting the critical residue limitation are not inherent in either Karaki et al. or Ota et al.; this showing, in conjunction with Table 1, evidences that applicants' beneficial results would not be inherent in the toners of Karaki et al. and Ota et al.

Applicants therefore conclude that each of claims 1 and 26, by virtue of the recited residue limitation, distinguishes patentably over Karaki et al.; over Ota et al. in view of Inaba et al. and Diamond; and over Karaki et al. in view of Inaba et al. and Diamond. Claims 2 - 8 and 27 - 33, being respectively dependent on claims 1 and 26, are submitted to be allowable therewith.

For the foregoing reasons, it is believed that this application is now in condition for allowance. Favorable action thereon is accordingly courteously requested.

Respectfully,

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I hereby certify that this paper is being deposited this date with the U.S. Postal Service as first class mail addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

Christopher C. Dunham

Christopher C. Dunham, Reg. No. 22,031

Date JANUARY 22, 2003

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Satoru MIYAMOTO et al.
Serial No.: 10/032,172 Group Art Unit 1756
Filed : December 21, 2001 Examiner C. RoDee
For : TONER FOR USE IN ELECTROPHOTOGRAPHY, IMAGE FORMATION METHOD USING THE TONER, METHOD OF PRODUCING THE TONER, AND APPARATUS FOR PRODUCING THE TONER

SECOND DECLARATION UNDER 37 C.F.R. § 1.132

I, Satoru MIYAMOTO, declare that:

1. I am one of the joint applicants named in the above-identified U.S. patent application, and am the same person who executed a previous Declaration under 37 C.F.R. § 1.132 ("my previous Declaration") on June 21, 2002, for that application.

2. My previous Declaration set forth results of comparative tests I conducted with "100 g of each of the toners in Examples 1 to 3 of Karaki et al." and with "100 g of each of the toners in Examples 4 and 5 of Ota et al."

3. The toners tested in the aforementioned comparative tests, and respectively designated "toners in Examples 1 to 3 of Karaki et al." and "toners in Examples 4 and 5 of Ota et al." were prepared by me as follows:

Example 1 of Karaki et al.

The following components were mixed using a blender:

- Styrene-butyl acrylate-maleic acid butyl half ester co-polymer, 100 parts (THF-insoluble matter: 0.5%, GPC of THF-soluble matter: peak of molecular weight, ca 43,000; proportion of mol. wt of less than 50,000, 50%; proportion of mol. wt of 50,000 to 500,000, 42%; proportion of mol. wt of more than 500,000, 8%)
- Magnetic material, 100 parts (shape: sphere, average particle diameter: 0.20 μm)

- Monoazo dye-iron complex, 2 parts (average particle diameter: 1.5 μm)
- Low molecular weight polyethyl ne, 4 parts (DSC endothermic peak: 106.7 °C, Mw/Mn 1.08)

The mixture was melted and kneaded, pulverized and then classified to prepare toner particles.

Then 100 parts of the thus prepared toner particles were mixed with 1.2 parts of a dry-type silica which had been hydrophobized with a silicone oil and hexamethyldisilazane and which has a primary particle diameter of 0.02 μm, using a mixer to prepare a toner.

<u>Example 2 of Karaki et al.</u>

The following components were mixed using a blender:

- Styrene-butyl acrylate-maleic acid butyl half ester copolymer, 100 parts (THF-insoluble matter: 1.5%, GPC of THF-soluble matter: peak of molecular weight, ca 41,000; proportion of mol. wt of less than 50,000, 60%; proportion of mol. wt of 500,000 to 50,000, 30%; proportion of mol. wt of more than 500,000, 10%)
- Magnetic material, 100 parts (shape: sphere, average particle diameter: 0.24 μm)
- Monoazo dye-iron complex, 2 parts (average particle diameter: 1.6 μm)
- Low molecular weight polyethylene, 4 parts (DSC endothermic peak: 106.7 °C, Mw/Mn = 1.08)

The mixture was melted and kneaded, pulverized and then classified to prepare toner particles.

Then 100 parts of the thus prepared toner particles were mixed with 1.2 parts of a dry-type silica which had been hydrophobized with a silicone oil and hexamethyldisilazane and which has a primary particle diameter of 0.02 μm, using a mixer to prepare a toner.

<u>Example 3 of Karaki et al.</u>

The following components were mixed using a blender:

- Styrene-butyl acrylate-maleic acid butyl half ester copolymer, 100 parts (THF-insoluble matter: 1.5%, GPC of THF-soluble matter: peak of molecular weight, ca 45,000;

proportion of mol. wt of less than 50,000, 55%; proportion of mol. wt of 50,000 to 500,000, 35%; proportion of mol. wt of more than 500,000, 10%)

- Magnetic material, 100 parts (shape: sphere, average particle diameter: 0.21 μm)
- Monoazo dye-iron complex, 2 parts (average particle diameter: 1.4 μm)
- Low molecular weight polyethylene, 4 parts (DSC endothermic peak: 106.7 °C, Mw/Mn = 1.08)

The mixture was melted and kneaded, pulverized and then classified to prepare toner particles.

Then 100 parts of the thus prepared toner particles were mixed with 1.2 parts of a dry-type silica which had been hydrophobized with a silicone oil and hexamethyldisilazane and which has a primary particle diameter of 0.015 μm, using a mixer to prepare a toner.

<u>Example 4 of Ota et al.</u>

The following components were mixed to prepare a polymerizable composition:

Styrene	80 parts by weight
2-ethylehexyl methacrylate	20 parts by weight
Grafted carbon black	5 parts by weight
Chromium complex dye of naphthoic acid	1 part by weight
Divinyl benzene	0.5 parts by weight
ADVN	2 parts by weight

The polymerizable composition was added into 480 parts by weight of water including tricalcium phosphate (in an amount of 0.086%) and dodecylbenzene sulfonate (in an amount of 0.005%). The mixture was suspension-polymerized. Thus, a suspension including polymer particles was prepared. The polymer particles were washed, filtered and then dried.

<u>Example 5 of Ota et al.</u>

The following components were mixed:

Styrene-acrylic copolymer	100 parts by weight
Grafted carbon black	8 parts by weight
Chromium-containing complex azo dye	1 part by weight
Low molecular weight polypropylene	0.5 parts by weight

The mixture was dissolved/dispersed in toluene to prepare a resin solution. The resin solution was sprayed/dried to prepare a particulate toner.

4. The above-described toners in Examples 1 to 3 of Karaki et al. and the toners in Examples 4 and 5 of Ota et al. were prepared so as to have the specified particle diameter and circularity. Namely, the particle diameter and circularity thereof are as follows:

			Average particle diameter (μm)	Circularity
Karaki	Ex.	1	6.1	0.96
	Ex.	2	4.0	0.96
	Ex.	3	4.3	0.94
Ota	Ex.	4	11.0	0.96
	Ex.	5	7.1	0.96

There are no data with respect to the particle size frequency.

5. The reason why the residue is different between the toner of the present invention and the reference toners is considered to be that the toners have different aggregation property. The aggregation property of a toner is largely influenced by the species and addition quantity of the fluidity imparting agent (i.e., an external additive) and the mixing state of the fluidity imparting agent with the mother toner particles. Therefore, even when toners have the same particle diameter and circularity, the amount of the residue of the toners changes depending on the species of the materials used and mixing conditions.

6. Measurements of circularity - Applicants' measurement of circularity is the same as in Japanese Laid-Open Patent Application No. 10-097095.

There is the following description in Japanese Laid-Open Patent Application No. 10-097095:

"The circularity of a particulate material is measured to simply and quantitatively represent the shape of the particular material. In the present application, the circularity is measured

using a Flow Particle Image Analyzer FPIA-1000 manufactured by Toa Medical Electronics Co., Ltd. The circularity of a particle is defined by the following formula (1):

$$\text{Circularity } a = Lo/L \quad (1)$$

wherein Lo represents the peripheral length of a circle having the same area as that of the particle and L represents the peripheral length of the particle.

"Specifically, the circularity of a particulate material is measured as follows:

"A surfactant (preferably an alkylbenzene sulfonic acid salt) of 0.1 to 0.5 ml, which serves as a dispersant, is added to 100 to 150 parts of water from which impurities have been removed. Then 0.1 to 0.5 g of a sample is added thereto. The mixture is dispersed with an ultrasonic dispersing device for 1 to 3 minutes to prepare a dispersion including from 3000 to 10,000 particles of the samples per 1 μl. The dispersion is set in the Flow Particle Image Analyzer FPIA-1000 to measure the circularity of the sample."

In the above-identified application, the circularity is measured by the Flow Particle Image Analyzer FPIA-1000, as described at page 18 of the present specification. Namely, in the present U.S. application, the circularity is measured by the same method as mentioned in Japanese Laid-Open Patent Application No. 10-097095.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Satoru Miyamoto
Satoru MIYAMOTO

Date: *January 20, 2003*

受信時刻 1月20日 9時10分